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PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: Confirmation No: 8232

UNDERWOOD et al.

Application No.: 10/712,091 Group No.: 2832

Filed: November 14, 2003 Examiner: Rojas, Bernard

For: SWITCHABLE PERMANENT MAGNETIC DEVICE

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

SUBMISSION OF PRIORITY DOCUMENT

Attached please find the certified copy of the foreign application from which priority is claimed for this case:

Country	Application Number	Filing Date
Australia	PQ4466	12/6/1999

Date: September 20, 2005
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Patent Office
Canberra

I, LEANNE MYNOTT, MANAGER EXAMINATION SUPPORT AND SALES hereby certify that annexed is a true copy of the Provisional specification in connection with Application No. PQ 4466 for a patent by FRANZ KOCIJAN and PERRY JOHN UNDERWOOD as filed on 06 December 1999.

WITNESS my hand this
Twenty-fourth day of August 2005

LEANNE MYNOTT
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AND SALES

COMMONWEALTH OF AUSTRALIA
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SWITCHABLE (VARIABLE) PERMANENT MAGNET DEVICE
provisional specifications

A switchable (variable) permanent magnet device can be constructed as described below. The device consists of a minimum:

- two active magnetic components (1 and 2) which form a magnetic circuit. Depending on their relative position to each other, different magnetic flux directions can be achieved. The magnetic materials used shall have high magnetic remanence (e.g. rare earth magnets like Neodymium-Iron-Boron).
- one pair of passive magnetic components (magnetically separated poles 3 and 4) which assist in the formation of the said magnetic circuit. The passive magnetic materials shall exhibit low magnetic reluctance (e.g. soft iron or permalloys).

Principle of operation:

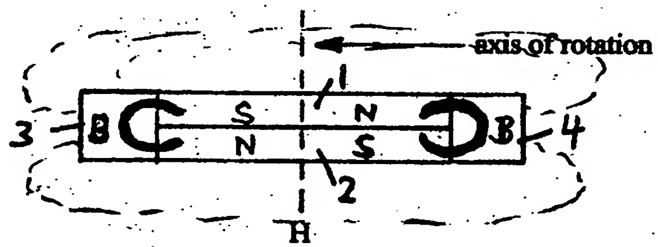

fig 1
High internal magnetic flux B between the active materials, assisted by the passive pole materials. Low external magnetic field intensity H.

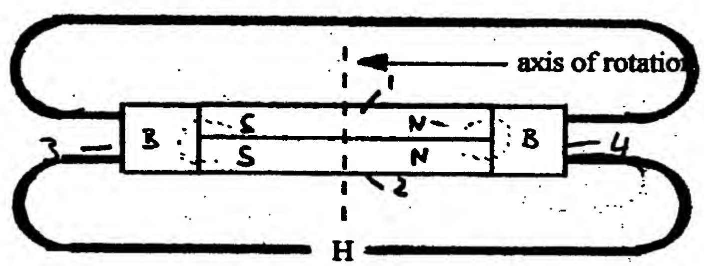

Fig.2
Low internal magnetic flux B between the active materials. High external magnetic field intensity H.

SWITCHABLE (VARIABLE) PERMANENT MAGNET DEVICE
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Construction (see fig. 3):

One way to realise the principles shown in fig.1 and fig.2 can be:
The active magnetic components (1 and 2) are disc shaped and diametrically permanently magnetised. They are embedded within the passive pair of poles (3 and 4) in such manner, that one of the said permanently magnetised discs (2) remains fixed between the said poles with good magnetic coupling. The magnetic orientation of the disc shall be such that the poles become fully magnetised. The other permanently magnetised disc (1) is mounted on top of the said disc (2) in such way that it can be rotated (e.g. lever, sprocket, hydraulic). If the upper magnetic disc (1) is rotated that the magnetic poles of the discs are aligned as shown in fig.1, a low external magnetic field results and the device is "switched off". Rotation of the upper magnet so that the alignment of the magnetic poles corresponds to fig.2 will result in a high external magnetic field. The device is "switched on".

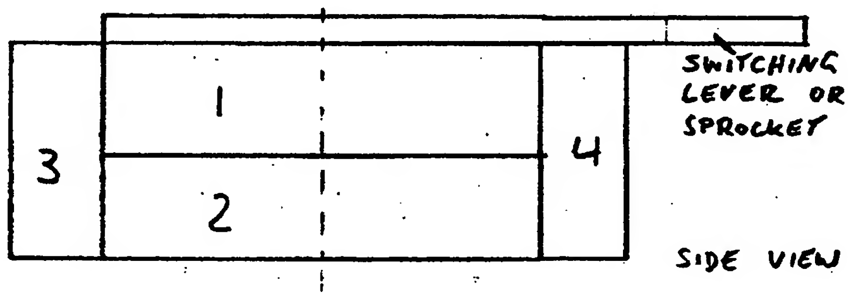

fig.3
Provisional drawing of the switchable (variable) permanent magnet device.

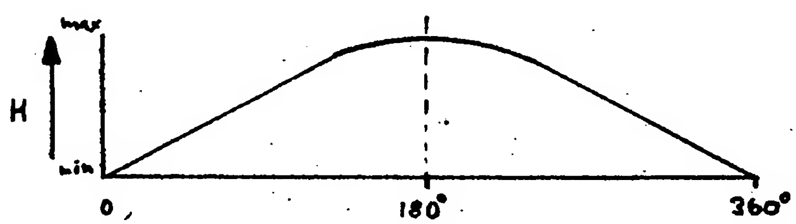

fig 4

Fig.4 shows the analog relationship between the angle of rotation and the variation of the external magnetic field.
The exact characteristics of the curve depends on the way the discs (1 and 2) are magnetised and their physical shape as well as the shape of the poles (3 and 4). Variation of the ratio of the magnetic energy products of the used discs (1 and 2) can achieve further modification of the curve in fig 4. to suit particular applications.

Further increases in external field strengths can be accomplished by shaping the wall thickness of the said poles (3 and 4) in such way, that they reflect the variation of the magnetic field strength around the perimeter of the said permanently magnetised discs (1 and 2).

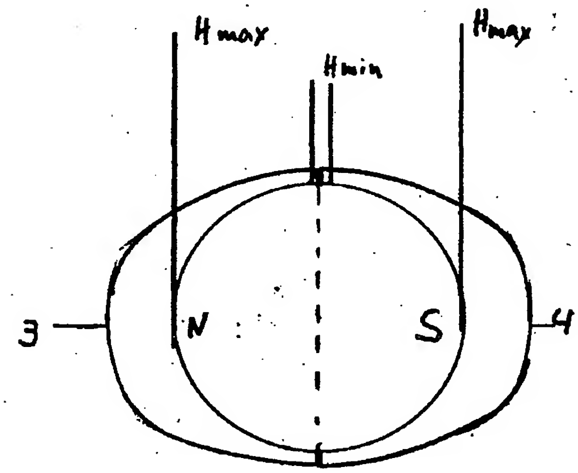

fig.5
Bottom view

Fig.5 indicates the design of the poles shaped in accordance with the variation of the field strength H around the perimeter of the said discs (1 and 2). The application of the inverse square law of magnetic fields achieves good results but specific materials and applications may influence the optimal shape.

This switchable permanent magnet device can be designed to fit into any conceivable housing to match the application.